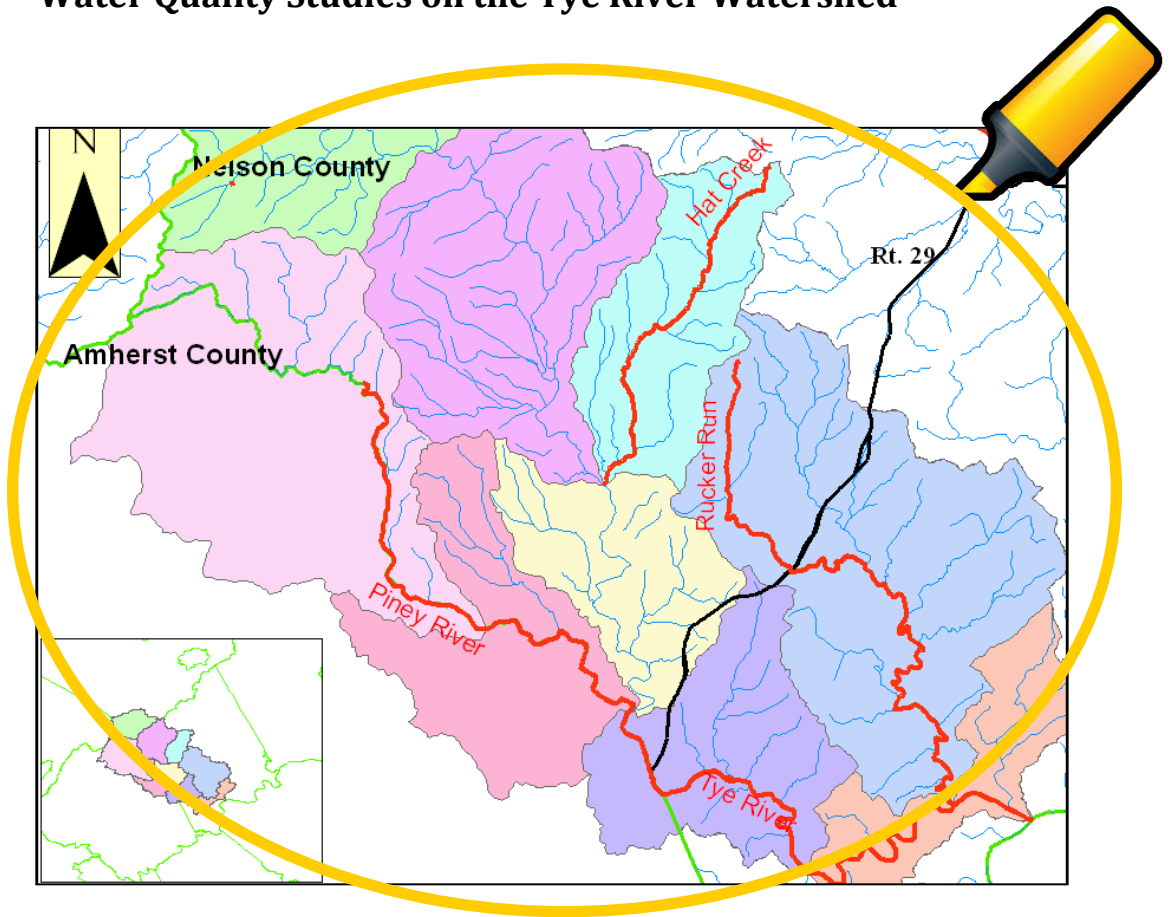


HIGHLIGHTING LOCAL STREAMS:

Water Quality Studies on the Tye River Watershed



The Virginia Department of Environmental Quality (VADEQ) monitors the Commonwealth's streams and rivers (*there are 52,232 miles of them!*) for five uses: fishing, swimming, wildlife, aquatic life (benthic), and drinking. When streams fail to meet standards based on these uses, they are declared to be "impaired", or not fully supportive of their beneficial uses, and placed on Virginia's impaired waters list. VADEQ reports this list to the USEPA every other year as required by the federal **Clean Water Act** of 1972. Based on routine water quality monitoring, several streams in Nelson County have been added to the list of waterways in Virginia that do not meet water quality standards. Hat Creek, Piney River, Rucker Run and the Tye River were listed as "impaired" in 2004, 2006, and 2008 due to violations of the recreational use standard (excess *e. Coli* bacteria). A **Total Maximum Daily Load** must be prepared for streams that do not meet water quality standards and are listed as impaired.

*Are we being singled out?
No. In Virginia, 68% of
assessed streams are
considered "impaired".*

TOTAL MAXIMUM DAILY LOAD

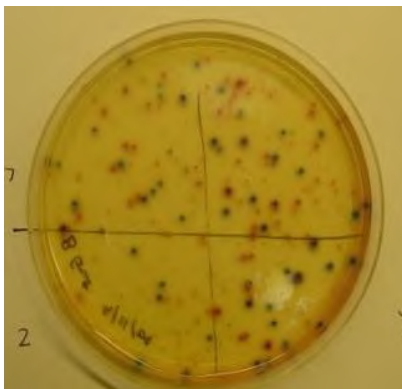
A **TMDL** is a pollution budget for a stream, which sets a maximum amount of a pollutant that can enter a stream but still allow the stream to maintain water quality standards. It is also the process of improvement that Virginia uses to make streams healthier and cleaner. This report is part of the TMDL studies for these streams.

What is the primary contact standard?

The code of Virginia states that all of Virginia's waterways are designated for several different uses, including "recreation... e.g. swimming and boating" (9VAC 25-260-10). These activities involve contact with the water – people getting their feet, bodies, and heads wet. People are naturally attracted to waterbodies whether to wade, fish, swim or paddle, and streams should be **safe** places to enjoy Virginia's great outdoors.

Why do we care about bacteria? Why is too much bacteria a problem?

VADEQ is charged with ensuring that Virginia's waterways are **safe** places to play and swim. This implies a low risk of contracting a gastro-intestinal illness from being in the water. Illnesses of this type can be caused by bacteria in the stream water. VADEQ monitors a strain of bacteria in the fecal coliform family to ensure that streams are **safe** for people to enjoy. This strain is known as *Escherichia coli* or *E. coli*. VADEQ visits streams all over the Commonwealth on a regular basis to take water samples and measure the concentration of bacteria colonies. The higher the concentration of bacteria in the water, the higher the likelihood of ingesting *E. coli*, and the greater the risk of illness. Virginia's water quality standard is set so that a stream's samples should not exceed an *E. coli* concentration of 235 colonies per 100 mL of stream water more than 10.5% of the time.

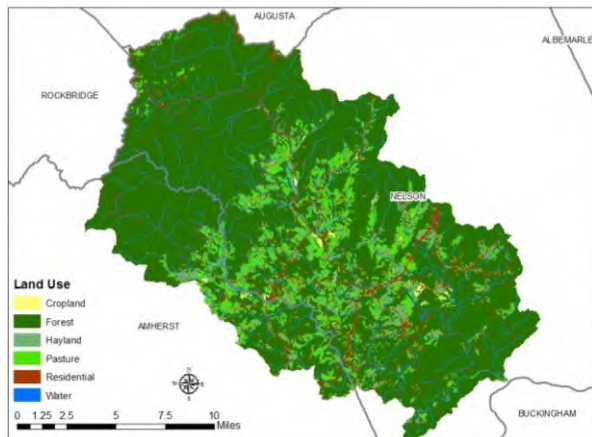


Each of the purple-blue dots on the slide to the left is an *E. coli* colony – a cluster of bacteria growing all together. When bacteria grow, the molecules of bacteria grow on top of each other, eventually becoming visible to the naked eye. The reddish colonies at left are fecal coliform colonies, which is the family of bacteria that *E. coli* belongs to. Many folks relate *E. coli* to food poisoning, but it can also be ingested from water sources with similar disastrous consequences. (Photo Credit: Sandy Greene, HSWCD)

Where is the bacteria coming from? Sources of pollution are typically divided into two categories - **point** and **nonpoint sources**. The bacteria in the Tye watershed comes primarily from **nonpoint source** pollution including agricultural and residential lands.

Agricultural lands' runoff often contributes bacteria from cropland and hayland if proper controls are not in place. In addition, cattle directly deposit bacteria into streams adjoining pasture. Residential lands contribute bacteria from improperly functioning septic systems, and from straight pipes (pipes that take sewage directly from the house to the stream with no treatment in between). Other nonpoint sources, including pets and wildlife, were determined to have a minor influence on bacteria levels. Permitted point sources in these watersheds are limited, but are accounted for at their maximum level of discharge.

WHAT IS A WATERSHED?
It's an area of land that drains to a common point or body of water.



LANDUSES IN THE TYE RIVER

WATERSHED:

Forest -- 76%

Pasture -- 11%

Cropland -- 6%

Residential -- 6%

Source: National Agricultural Statistics Service (NASS) 2009 compiled by VT-BSE.

What is being done? (And what, really, is a TMDL?)

VADEQ and its local and state agency partners have been working together on the Tye River watershed since 2012 to determine sources of bacteria, suggest reductions, and recommend next steps in the process known as the **Total Maximum Daily Load (TMDL)** process. In these **TMDL** studies for Hat Creek, Piney River, Rucker Run and the Tye River, a watershed-based approach was used to relate both land-based and in-stream sources of pollutants to water quality problems. Local community participation has been key to the development of this TMDL. Local residents, farmers, paddlers and representatives from interested organizations volunteered their time to attend meetings and review data as part of the **Technical Advisory Committee (TAC)**. Their involvement was necessary to create an accurate and reliable picture of the watershed and its land uses. The TAC considered and gave feedback on such information as: background pollutant concentrations, point source contributions, and non-point source contributions. Through the **TMDL** process and the local expertise of **TACs**, Virginia is able to identify water-quality based controls to reduce pollution and meet water quality standards.

How do the local stream TMDLs relate to the Chesapeake Bay TMDL?

These local TMDLs are based on monitoring of local streams and have been developed to identify the bacteria reductions needed in order for these streams to support safe recreation. The Chesapeake Bay TMDL was developed using monitoring data collected within the Chesapeake Bay watershed which consists of six states and the District of Columbia. It has been developed to identify the nitrogen, phosphorous and sediment reductions needed to restore the water quality in the Chesapeake Bay. The Chesapeake Bay itself is downstream from Nelson County's local streams and their watersheds. As such, these local streams are components of the larger watershed that drains into the Chesapeake Bay, meaning that whatever enters local streams eventually enters the Chesapeake Bay. Conversely, pollutant reductions to local streams also reduce pollutant loading to the Bay. While these TMDL studies for the Tye River and its tributaries are focused on how to reduce bacteria, the measures taken to reduce bacteria will also result in reductions of sediment, nitrogen and phosphorus transported to the streams. Therefore, all best management practices and pollutant reductions from these local TMDLs also contribute to the reductions needed to meet Chesapeake Bay cleanup goals.



Whatever we do to clean up our local streams will also help downstream.

So, what reductions are recommended?

When looking at the sources of bacteria in the Tye River Watershed, straight pipes are of primary concern because of their risk to human health. Virginia would like to eliminate all discharges of raw sewage to waterways, including straight pipes and failing septic systems. In addition, reducing direct deposits to the streams from cattle is recommended to make a large difference to bacteria levels. These "direct" sources of bacteria contain many colonies and in times of hot weather, bacteria can even reproduce in the open air. By comparison, bacteria deposited on the ground and then carried to the stream by runoff does not live as long because it is exposed to the elements. Taking care of the "direct" sources first is an efficient and effective way of reducing bacteria. The **TAC** was able to provide information on likely sources of bacteria in the Tye River watershed and review all reduction options as part of creating this TMDL.

Where do these reductions come from?

There are many reasons to decrease the amount of bacteria coming into streams and rivers. Not only will a **safe** recreation environment be restored, but the streams will be cleaner for other uses, including supplying water to cattle and irrigating crops. The recommended reductions can be accomplished by installing practices to prevent **bacteria** from getting into the streams. Techniques that target the land uses that contribute the most bacteria will be most effective. With that in mind, the following reductions are recommended by the **TAC** for the streams that have excess bacteria in the Tye River Watershed:

Stream	Livestock Direct Deposit	Pastureland	Cropland	Straight Pipes & Failing Septics
Hat Creek	75%	25%	5%	100%
Piney River	40%	25%	5%	100%
Rucker Run	65%	25%	5%	100%
Tye River	10%	5%	5%	100%

What's next? Where do we go from here?

The goal of the **TMDL** program is to establish a three-step path that will lead to local streams and rivers returning to a safe and healthy state and again meeting water quality standards. The first step in the process is to develop **TMDLs** that will identify pollutant



reductions that result in streams achieving water quality standards, which is a federal requirement under the Clean Water Act. This report represents the culmination of that effort for the excess bacteria issues in the Tye River watershed. The second step, mandated by Virginia law, is to develop a **TMDL Implementation Plan – or “Clean-**

up Plan”. The final step is to put this **“Clean-up Plan”** into place! Implementation of these **TMDLs** will contribute to on-going water quality improvement efforts in these watersheds. There are lots of actions that landowners can do to clean-up Hat Creek, Piney River, Rucker Run and the Tye River itself, including: **fixing malfunctioning septic systems and straight pipes, considering pasture rotation, and providing alternative water supplies while fencing cattle out of streams.**

Want more information? Want to make a difference to your local stream?

Contact **Thomas Jefferson Soil and Water Conservation District** and the **USDA Natural Resources Conservation Service** for more information on available cost-share programs at 706 Forest St., Suite G, Charlottesville, VA 22903 or (434) 975-0224 or www.tjswcd.org.